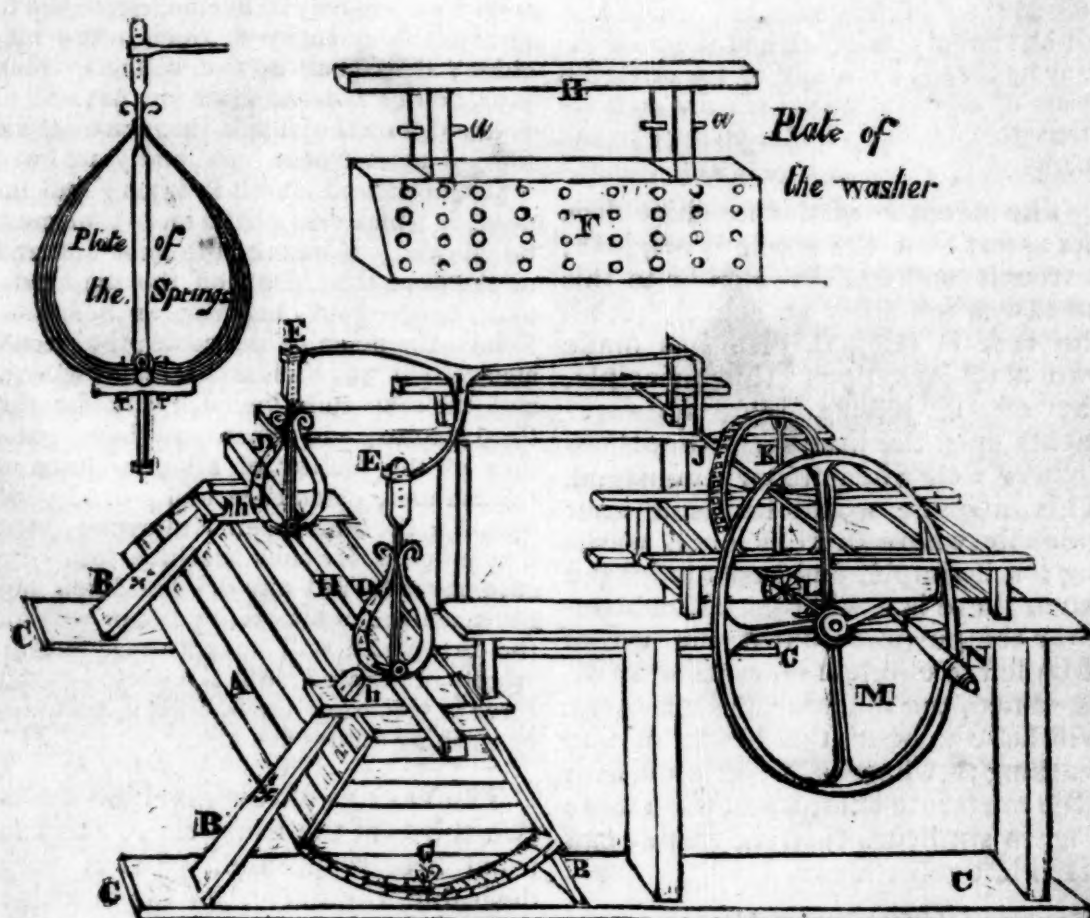


AMERICAN MECHANICS' MAGAZINE, Museum, Register, Journal and Gazette.

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“The more widely Science is diffused, the better will the Author of all things be known, and the less will the people be ‘tossed to and fro by the sleight of men, and cunning craftiness whereby they lie in wait to deceive—.’” *Mr. Brougham.*

WASHING MACHINE.



SIR—The drawing and description, &c. of a Washing Machine which I take the liberty of transmitting herewith, I shall be glad to see inserted in the *Mechanics' Magazine*.

I am, Sir,
Yours respectfully,
J. ARMSTRONG.

Northumberland House Academy,
Norwood.

VOL. II.—5

Description.

A is the washing-trough, supported upon four legs, BBBB, by two iron straps, screwed through the legs, by the nuts, *xx*; the legs are let into the frame, CCCC; at the end of the trough is a cock, G, to carry off the soap suds; in the trough is a washer similar to F, perforated with holes, and borne by the beam, H, upon the cross bars, *hh*, by the spindles, *aa*. Upon the beam, H are two iron pillars, EE, with a joint

near the beam, H; on each side of the iron pillars are strong springs, DD, of four or five leaves, set very proud at the top against the iron pillars, and bolted together at the bottom upon a stout piece of iron. The tops of the iron pillars are attached by a bolt to the beam, I, of the crank, J;* and upon the axletree of the crank is a tooth wheel, K, turned by a small pinion, L, upon the axletree of the fly-wheel, M, which is turned by the handle, N.

If a machine upon this plan be made with a trough three feet long, and the pinion, L, to revolve three times for the wheel K's once it will first fourteen or sixteen gentlemen's shirts in fifteen minutes, and second them in five minutes, making in all but twenty minutes, and the machine may be turned by a boy of ten or eleven years of age, as it would require no more strength than one of Mr. Baker's patent mangles.

The inventor of this machine does not assert that the whole is original; a trough and washer similar to this he saw when a boy at school, but all the rest is original. He has made two machines upon this principle, the second having some improvements upon the first, and they both answer well when properly managed. This machine would be found most valuable where there is much washing; it is simple, and easily managed when there is a will that it should answer the purpose; but if the use of it be left to careless servants or washerwomen, the machine, in such cases, will have to bear the blame of bad washing;† whereas, when used with even moderate skill, it will wash more linen in six hours than six women can wash in twelve hours.

Directions for use.

Soap your linen in warm water the day before washing; (this mode at all times materially assists the cleansing of foul linen;) dissolve about two-thirds of the soap (deemed necessary for cleansing your linen) in hot water, the night before you wash, to be ready for use. When you put your linen into the machine, be sure

* If several holes are made in the iron pillars, the pressure may be increased or decreased at pleasure.

† The inventor asserts this from real experience.

to put, as nearly as possible, the same quantity on each side of the washer, and let it be laid regularly along the trough, of the same thickness or quantity; for, if linen be laid thick in one place and thin in another, the thick part will be cleansed, and the thin but little.

Ladies' dresses, lace caps, and any thing delicately fine, should be put into a porous linen bag, or a fine meshed net, (indeed if, all small things were put into a small meshed net, so much the better, as it would prevent them being entangled by being washed over the top of the washer,) then no accident can happen to the linen.

When you have put your linen into the machine, pour upon it as much of the dissolved soap as may be deemed necessary to cleanse the quantity of linen in the machine; then pour in the water or soap suds, boiling hot, and after you have fixed your cover on the trough, turn the machine for one quarter of an hour, and your linen will be cleansed, unless it is very foul indeed, in which case a little more time must be allowed; then take the linen out, and at the same time draw off the soap suds, and charge your machine as before.—Whilst the machine is washing the second charge, get your cleansed linen wrung, and the soap suds boiled, ready for the third charge; and when you have gone through the firsting of all your linen in this manner, commence and pursue your second in the same manner, allowing about five minutes for each machine full. Be sure never to put any dry foul linen into the machine, as the boiling liquor will fix the dirt, which will never afterwards be wholly eradicated: this is a very common error in cleansing linen, where machines or washing dollies are used.

The savings of this machine are—two-thirds of the usual time, half the usual fire, soap, and, what is very desirable, the linen; for the machine does not wear the linen a tenth part so much as the hands, neither does it tear the linen. One has been in use for eight or nine years, and it has never been known to tear or injure any thing, although it has cleansed the most delicate parts of dress.

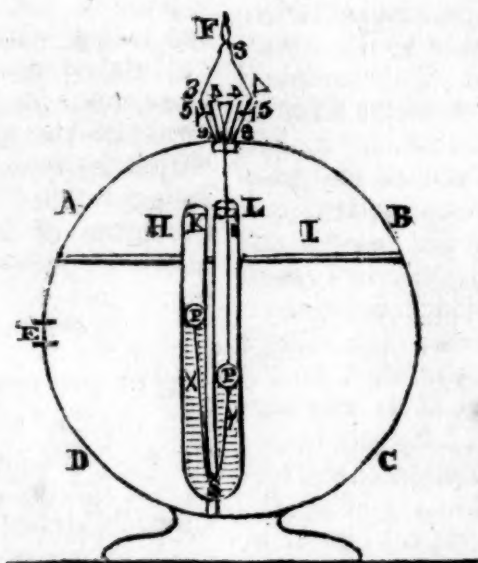
This machine may easily be made to wash in any pressure of steam; and if constructed for that intent, it would (in the humble opinion of the inventor) far surpass any steam washing machine yet made; for with-

out pressure linen cannot be cleansed in any moderate time, and cylindrical wheels, revolving in a case, may, by the linen constantly falling from the centre, chafe the cloth nearly, if not quite as much as the hands. One proof that this machine does not wear the linen is this: if you put in stockings with holes in them, the holes will not be in the least enlarged by

the machine, nor will it make holes in thin places; where linen on the contrary is cleansed by chafing, and not pressure, enlargement of the holes in stockings, and holes made in thin places, are sure consequences; this is a fact known to every domestic female.

Lond. Mec. Mag.

PORTABLE GAS LAMP, INVENTED BY MR. JAMES JONES, OF EDINBURGH.



Description.

ABCD represent the lamp; E, the opening at which the gas is forced in, by means of a pump, and F the jet at which it escapes and is consumed. H, I, is a bar to support the glass tube, KSL, open only at one end. The space from K to the float P contains mercury. The two floats, P and R, are connected by the string or chain, XY; and to the top of the float, R, the stout wire, l, l, is attached perpendicularly. To the top of this wire is affixed a cubical piece of metal, shaped on all sides like a wedge. This is contained in a kind of box, marked 3 3 3, which is also shaped wedge-like but with a greater angle at the bottom; 44, are two metal plates, each exactly the same size as one side of the box. These plates are to be pushed backwards or forwards by the screws 5, 5, till the aperture is adjusted, when the ends of the screws may be cut off.

Now, suppose the cubical vessel,

ABCD, empty of gas, the mercury in the tube is alike high at both surfaces. The forcing pump is applied at E; and as the gas is condensed, it compresses the air in the end of the tube at K: of course the mercury rises, carrying the float, P, up along with it; the other ball is drawn down, and brings down with it the wire, Z, which gradually stops the opening at the top of the wire; and as the gas contained is diminished, the pressure will be taken off the surface of the mercury at R, the air at K will expand, and raise the wire, Z, and enlarge the opening: *ib.*

IMPROVED METHOD OF TANNING.

Dr. H. H. Hayden, of Baltimore, is said to have discovered a valuable improvement in the art of tanning, by means of a pyroligneous preparation. By his method raw hides, after hairing and baiting, are converted into leather in less than thirty hours.

INSTANCE OF EXTRAORDINARY VISION.

SIR,—In the Isle of France, during the last war, there resided a man who was in the pay of the Emperor Napoleon, and whose office consisted in informing the heads of the department of the approach of vessels to the island. The most powerful telescopes could afford no assistance whatever, compared to what was obtained in this respect by this man's naked eye. He mentioned, once, the arrival of a fleet, and the number of the ships.—They kept in the same station for many days, until joined by a squadron of ships, when they bent their course for the island. On their arrival there they answered precisely to the man's previous description. This he could at all times do; yet, stranger still, he always, on those occasions, looked downwards to a surface of water.—We know, that in peculiar states of the atmosphere, the air serves the purpose of a reflecting mirror: such were the instances of Capt. Scoresby's ship, seen in the clouds; the village of Great Paxton in the air; and a city of Switzerland, as if on the surface of a distant lake, lofty mountains lying between. Such phenomena frequently occur; but that the Frenchman should be able, at all times, no matter what the state of the atmosphere was, to penetrate so far into the depths of space, is a fact, I fear, beyond the power of human nature to account for.

Your obedient servant,

SALOPY THAMES.

ib.

CALCULATING BLIND BOY.

SIR,—I have a young friend, to whom I am much attached; he is entirely destitute of sight, and has been so from his infancy. When we consider the accurate calculations he has made, we are struck with astonishment. Should you deem the following production of his worthy of a place in your very valuable Miscellany, its insertion will be an inducement to send you some more of his performances, which are equally surprising. He is a native of Macclesfield, in Cheshire.

At the time when he communicated the following arithmetical results to me, he was learning music at the academy of Mr. B. of Manchester.—He makes his calculations by *feeling*. These productions evince him to be possessed of great mental powers, although entirely deprived of that celestial light which gives whiteness to the lily, and paints the flowers of the valley. His knowledge is the sciences of algebra and astronomy, particularly the latter, is extensive. He answered the first mathematical question proposed in the Ladies' Dairy for 1823, and was congratulated by the Editor of that respectable work for the talent which he displayed. He calculated to a surprising degree of exactness, for the meridian of Macclesfield, the great total lunar eclipse which happened on Sunday evening, January 26th, 1823. He made use of the table of Dr Brewster, who has much improved Ferguson's Astronomy.

If 99 stones were placed in a strait line, the first one yard from a basket, the second two yards, the third three yards, &c. the person who gathers up these 99 stones singly, returning with each to the basket to put it in, would travel no more than five miles 1100 yards; but if we suppose the first stone to be placed one yard from the basket, the second two yards, the third four yards, &c. doubling the distance every time, the person who undertakes to perform the task in like manner, must travel the enormous distance of 720,256022,856948,523577,673275 miles, 1375 yards.—Now, let us admit a body to move uniformly with the amazing velocity of light, which is 95,000,000 miles in seven minutes and a half, it would require 108,111486,793614 years to complete the above distance! And this last number is not less than 18563,098693 times the number of years since the creation of the world to the present time, which, according to chronologers, is 5824 years. Such and so very astonishing is the property of numbers in geometrical progression.

I am, sir, on behalf of my much esteemed and respected friend,

Yours, &c.

JOSEPH HALL.

March 5, 1825.

ib.

PRESERVATION OF APPLE TREES.

Mr. Thomas Aspinwall, of Brookline, Massachusetts, a deaf and dumb man, but notwithstanding a farmer of considerable celebrity, had the bark from a thrifty apple tree cut off quite round the trunk, by rabbits, during the continuance of snow on the ground. To remedy the injury, he raised the bark from the wood, both above and below the wound, and introduced a series of scions, appropriately cut from the same tree, between them. These scions pressed closely together, and continued round the trunk, were confined by ligatures passed around the bark, that had been separated from the wood as above; and then clay was applied, as is customary in the process of engrafting. The experiment, the first and only one of the kind that has come to my knowledge, succeeded completely, and the tree has since borne fruit (pippins) abundantly, and is now in a flourishing condition.

Connected with this subject, it is worthy of notice, that apple trees which have their branches thinned out, in order to increase the quantity, and improve the quality of fruit, very often sustain injury from the operation, on account of the careless manner with which it is performed. It is, in fact, owing to this circumstance that their trunks become hollow, they cease to bear fruit, and prematurely die.

The cause is obvious; for the severed trunk is left to bleed, and from exposure to heat and moisture soon crack open, and cavities are soon formed, in which water collects, and finally produces, in combination with other agents, the effects before named. Now, this evil may be remedied by merely keeping the truncated limbs covered with any kind of composition or coating, capable of counteracting the effects of heat and moisture, till

granulations have formed quite over them. I have seen limbs six inches in diameter closed over in this manner, by a new formation of wood and bark. To secure this result, the limb should be cut off previous to the ascent of the sap, when clay, or clay and cow's dung, paint, or even tow may be applied to the wound; but whatever is applied should be secured by close bandages, which require attention, and sometimes renewal.

Should these remarks be worthy a place in your truly valuable Magazine, please insert them, and oblige

A FARMER.

Roxbury, 1825.

PIN-GRINDER'S SAFETY APPARATUS.

SIR,—Your Magazine being published for the benefit of Mechanics, I beg to point out to you one class deserving the greatest commiseration, and who, through the ingenuity of some of your numerous Correspondents, will, I trust, shortly experience the relief which ought to be afforded to them. I allude to those men employed in grinding the points of pins. More wretched objects are no where to be found, and no men would voluntarily endure the sufferings they undergo, together with the forfeiture of their lives in a few years, did not good pay bribe them to the sacrifice. The evil arises from the quantity of brass dust which they inhale into the lungs, which brings on consumption, and which, by getting into the eyes likewise, brings on blindness. Some simple contrivance would obviate all this misery. A frame might be suspended to the ceiling, to be raised or lowered as required, the upper part of which should have glass in front, to see through; the lower part should be so managed as to fit closely to the nose and mouth, from which two tubes should be conducted to some little distance behind: one to convey fresh air, the other to carry off the foul air of the breath. The man's head should be placed in this frame when at work, and were it padded so as to fit closely round the neck, so that he could breathe through the tube only, no dust could be taken up by the breath,

nor could it reach the eyes. As these men generally work before a window, these tubes may be carried through that window.

I merely give my idea of a plan, which, I hope, some able head and hand will bring to perfection and general use.

I am sir, your obedient

Humble servant,

A FRIEND TO THE DISTRESSED

A Correspondent in a former Number, recommends that a sponge mask should be used for the same purpose, but the present contrivance seems better adapted for constant use.—
ED. LOND. MEC. MAG.

EFFECT OF IRON MASTS AND IRON STEAM-CHIMNEYS ON THE COMPASS.

Professor Barlow having been requested to give his opinion as to the probable effect which the projected hollow iron masts in men of war might have on the compass, he returned for answer, that he "thought it probable so great a surface carried above the deck would have a counteracting effect on the usual iron of the vessel, by bringing the common centre of attraction of all the iron nearly into a horizontal plane with the compass, and therefore, in these latitudes, nearly into the plane of no attraction, so as to leave it doubtful whether the actual effect would be the same as, or the reverse of what happens in the usual cases. If the power of the mast prevailed over the other iron, the effect would be reversed; but if, on the other hand, it did not amount to so much, then the effect would remain the same in quality, but would be diminished in quantity."

Mr. Barlow has since made a series of experiments to determine the local attraction of steam vessels, which present nearly a similar arrangement of materials to a vessel with an iron mast; the iron chimney standing in place of the mast, and the boiler and engine in lieu of the usual iron tanks, ballast, and guns. The result of these experiments fully confirms the theoretical opinion advanced by the learn-

ed professor. The counteracting power of the chimney was rendered very obvious, the local attraction having been found very inconsiderable, and just such as might have been predicted from the circumstance of elevating the common centre of attraction, as in the case of the iron mast above mentioned.

It appeared from another set of observations which the professor made with two compasses, one in the fore and the other in the aft line of the vessel that, with the ship's head to the east, the north end was repelled to the west, and with the head to the west, the north end passed to the east of its true bearing, which shows that the result was either due to the superior action of the chimney, or to some iron abaft the wheel, being *directly the reverse* of what generally takes place in the usual order of vessels in these latitudes. "Whether this (says the professor) is the case in all steam vessels with iron chimneys, may be worth the inquiry of those engaged in the navigation of them, particularly in those intended for voyages."

ib.

FRAUNHOFER'S REFRACTING TELESCOPE.

A Refracting Telescope, of extraordinary power, manufactured by the celebrated Fraunhofer, has just been erected at the Observatory of Dorpat. When in a perpendicular position, the height of the object-glass is 16 feet 4 inches (Paris measure) from the floor, 13 feet 7 inches of which belong to the telescope itself, so that the eye-glass stands 2 feet 7 inches from the floor. The diameter of the object-glass is 9 Paris inches, (about 9 3/4 inches English.) The weight of the whole instrument is about 3000 Russian pounds. It is so constructed that it may be used as an equatorial. The upper part of the instrument consists of the tube, with its axis of motion, two graduated circles, and a variety of levers and counterpoises, producing the most perfect equilibrium in every direction, and providing against all friction. The decli-

nation circle is directed from 10' to 10', but, by means of the vermic, may be read off to 5". The instrument may be turned in declination with the finger, and round the polar axes with still less force. The most perfect motion round the polar axes is produced by means of clock-work, which is the principal feature of this instrument, and the greatest triumph for the artist, the mechanism being as simple as it is ingenious. A weight attached to a projection connected with an endless screw, overcomes the friction of the machine. The clock, vibrating in a circle, regulates the motion by moving an endless screw, connected with a second wheel in the above projection. The weight of the clock, as well as that of the friction may be wound up without the motion being interrupted. When the telescope is thus kept in motion, the star will remain quietly in the centre, even when magnified 700 times; at the same time, there is not the least shake or wavering of the tube, and it seems as if we were observing an immoveable sky. But the artist has done still more; he has introduced a hand on a graduated dial of the clock, by which the motion of the latter can be instantly altered; so that a star may be brought to any point of the field of vision to which it may suit the observer to carry it, according as it is required to make the course of the instrument go faster or slower than the motion of the heavens; and if once placed, it may be kept in that position by returning the hand to its original position.—The same mechanism is also used to make the motion of the instrument coincide with that of the sun and moon.

This instrument has four eye-glasses, the least of which magnifies 175 times, and the largest 700 times.—Professor Struve has compared the power of this telescope with Schroeter's 25 feet reflector, by means of which that astronomer saw the constellation of Orion twelve or thirteen fold; whereas Struve clearly ascertained the existence of sixteen distinct stars. This instrument is furnished with four annular micrometers, of

Fraunhofer's construction, and an excellent net micrometer of the same artist. By means of these, it appears that the probable error in the measurement of some minute distances, of 7" and under, did not exceed the 18th part of a second. The expense of this instrument was about 950 pounds sterling.

ib.

BAKING MACHINERY WANTED.

SIR,—Among the various improvements which modern times have produced, and to many of which your very useful Magazine has given publicity, it is rather extraordinary that the slovenly and highly objectionable mode of manufacturing bread, both in large and small bakeries, should hitherto be so entirely overlooked as not to call forth one solitary suggestion towards an improvement. The great desideratum is to preclude the necessity of workmen using their naked hands and arms, by a total immersion of them in the *material*, in the process of the work, which, under a warm temperature, and without the most particular attention to cleanliness, must, on reflection, suggest ideas not very encouraging to the general use of that article. I would, therefore, beg leave to call the attention of some of your ingenious Correspondents to this important subject, not doubting but that this hint will induce it to be eagerly taken up, when its importance to the public is duly considered. Answers to the following questions may perhaps lead to the means by which the object sought may be accomplished:—

1. What sort of machinery could be best applied to the purpose of mixing (primarily) the sponge, and, thereafter, the sponge and salt liquor, in bakeries where the business is done on a large scale, and now performed by total immersion of the workman's hands and arms?

2. In such case what must be the form of the kneading troughs?

3. What description of tools or apparatus could be most usefully applied to the mixing and incorporating the material, viz. the flour and li-

quor, and afterwards kneading it, without bringing the naked hands and arms of the workman in contact therewith?

4. What description of apparatus could be effectually applied to the kneading and pressing the dough, after being boarded for scalding, &c?

5. What means could be devised for shifting it from the troughs, and from one place to another of the bakehouse, without having recourse to the present mode of taking it up in the workman's arms?

These inquiries, if satisfactorily answered, must accomplish three important objects—first, cleanliness, and despatch in the manufacture of that staff of life—bread; secondly, giving to the workmen a neat, clean, and workman-like appearance, instead of a filthy and slovenly one; thirdly, the removal of the cause of that infirmity or defect in the limbs with which working bakers are sometimes afflicted, and which has given rise to the term *baker-legged*.

Next, in respect of ovens.

What are the means by which the expansive force of the flame issuing from the furnace may be increased and its progress delayed from the suction flue, so as to make it spend all its power on the oven, and at the same time diminish the expenditure of fuel? And by what means can this be best effected, with a proper regard to cleanliness, ventilation, and temperature?

I have no doubt but some of your ingenious Correspondents will endeavour to render to the public that extensive service which a satisfactory answer to those questions must infallibly produce.

I am, sir, your obedient

Humble servant,

A. B. C.

ib.

ON THE PREPARATION OF CARMINE.

The fine carmine de Langlois of Paris, is made by first boiling four pails of river water in a copper boiler. Two pints of this water are drawn off as soon as it boils, upon five eggs, pre-

viously beat up, shells and all, in a terrine; and the emulsion thus formed is kept aside for use. There is then poured into the boiler a filtered solution of 10 Troy Dracms of Alicant barilla, in four pints of boiling water, and at the same time 28 ounces of cochineal mesteque, coarsely powdered, are added, and boiled for half an hour, being kept stirred. The boiler is then taken from the fire, 15 Troy drachms of real Roman alum powdered, are added, the whole stirred once, and left to stand ten or 12 minutes, or until, in the perfumer's phrase, the carmine is come; that is to say, that the violet colour of the decoction is changed to a bright scarlet. The liquor is then poured off into another boiler; the emulsion above mentioned strained and added, and a boil given to the whole: after which it is poured out upon a cloth strained upon a frame, which retains the carmine; the liquid that passes through the strainer is used for preparing lakes.

In the preparation of the superfine carmine of Madame Cenette of Amsterdam, very different salts are used. Six pails of water are set on the fire, and, as soon as it boils, 2lbs. of cochineal mesteque, in fine powder, are added. When the boiling has been continued for two hours, three ounces of purified saltpetre are added, and directly afterwards four ounces of the true salt of sorrel, and the whole left to boil for ten minutes; the boiler is then removed from the fire, and left for four hours to settle. The water is drawn off by means of syphons into a number of terrines, and these are placed for three weeks on a shelf.—After a few days a mouldy pellicle appears, which is taken off with a sponge. The water is at last drawn off again by syphons; the carmine adheres strongly to the sides of the terrines. It is very bright, so much so that it fatigues the eye.

There is another carmine, called the Chinese, in which the muriate of tin are employed as follows:—20 oz. of very finely powdered cochineal are boiled in a pailful of river water; 60 grains of Roman alum are then added, and the boiling continued for seven

minutes. The boiler is then taken from the fire, and the liquor strained or decanted into another vessel, and laid by. Aqua regia is prepared by dissolving ten ounces and a half of common salt in a pound of aquafortis, and in this four ounces of filings of Malacca tin are dissolved, by adding a little at a time. This solution of tin is then dropped gradually into the decoction of cochineal previously heated, and the carmine falls down. When all the carmine is settled, the liquid is decanted.

Sometimes soda is used instead of potash, as in the process of Alyon.—Two pailsful and a half of river water are boiled, and a pound of ground cochineal added by degrees. After boiling half an hour, there is added a ley, composed of 5 drachms Troy of soda, dissolved in a quart of water, and the boiling is continued for another half hour. The boiler is then taken from the fire, and placed sloping on a plank, six drachms Troy of alum are added, and after settling for near half an hour, the bright scarlet liquid is poured off into a basin, and there is added the whites of two eggs, beat up with half a pint of water;—the whole is well stirred, then put on the fire and made to boil, when the white-of-egg of course coagulates.—The vessel is then taken from the fire, left for half an hour to settle, the liquid is poured off, and the settling is turned out on a fine cloth to drain; when drained, the carmine is taken off, and dried on plates covered with sheets of white paper. A pound of cochineal yields by this proceed half an ounce of carmine.

From these receipts it evidently appears that alum is not essentially necessary in the preperation of carmine, as some authors have averred; for its place may be supplied either by the salt of sorrel, or the muriate of tin.

Messrs. Pelletier and Caventou have separated from cochineal a peculiar principle, which, being the basis of this colour, they call carmine, and others cochenilline or carminum.

Lond. Mec. Jour.

ON REFINING CAMPHIRE.

Camphire being imported from the East Indies is in a brown rough state, it has yet to be refined in Europe to fit it for sale. This operation was first practised at Venice, from whence the mode of refining passed to Holland, England, and lately to Berlin, and France.

The manner of refining camphire is principally founded on the property it possess, of being volatilized at the temperature of 204 deg. cent. or 399 deg. Fahr. The Dutch process, which is that usually practised, is as follows:—

One part of lime is mixed with 50 of rough camphire; the mixture is put into a large bolt head, or matrass formed of very thin glass, and this is placed in a sand bath, which is to be gradually heated. If the sand bath is already heated, the matrass is merely put on the sand at first, and sunk by degrees, so that all the camphire may be melted before the glass is sunk so deep that the surface of the melted camphire within it is below the level of the sand. The warm sand is then brought up the sides of the matrass, as far as the neck, in order that the portion of camphire which has sublimed during the melting of the camphire, may, as it is generally fouled, be melted, and run down again to the general mass. The upper part of the matrass is then freed from the sand, in proportion as the camphire sublimes.

This operation, although apparently simple, requires much care, or rather experience, without which it is scarcely possible to produce a saleable article; and there is even a danger of explosion.

If the heat is raised too suddenly, the neck of the matrass may get filled with camphire before the heat has reached the highest degree to which it may be carried, and then the heat suddenly rising may occasion an explosion.

If the operation is conducted slowly, and so that the upper part of the matrass is not heated near the degree of temperature necessary for melting camphire, that is to say 175

deg. cent. or 347 deg. Fahr., then the camphire does not form a mass sufficiently dense and close, but has a snowy opaque appearance, very different from the transparency necessary for its saleableness.

Sometimes when the heat is increased in an irregular manner, the mixture of lime and camphire rises up from the bottom of the matrass, and fouls the cake of sublimate, so that it is obliged to be re-melted.

Several useful alterations have been made in this process which appear to have produced some improvement.

If two parts of finely ground bone-black is mixed with the mixture of fifty parts of camphire, and one of lime, the small portion of colouring matter which is present in the rough camphire will be retained, and the cake of refined camphire will be whiter than usual.

The too quick evaporation of the camphire from the bottom of the vessel frequently occasions risings, which take place oftener when the rough camphire is mixed with a large quantity of extraneous matter, which is apt to settle in the melted mass — Hence the fire ought to be carefully managed, especially at the commencement: and these risings will be still better prevented by introducing into the matrass a spiral worm of platinum wire, for the purpose of distributing the heat equally among the whole mass of the melted liquid, and of thus avoiding the irregular formation of vapour from the bottom of the vessel.

The operation may be hastened, and with a saving of fuel if instead of being placed in a thick cast iron sand pot, with a layer of sand under it, the matrass is exposed to the immediate action of the fire, by merely hanging the matrass in a round hole over the fire. In this case the bottom of the matrass, so far as enters into the furnace, ought to be luted, and it should be supported by a cross of iron wire; it should also be surrounded with a ring of mortar, over which the sand may be heaped, and managed as already mentioned.

In whatever manner the refining is

to be performed, it is particularly necessary that the laboratory should be so arranged, that a single workman may see all the matrasses, and examine them without displacing any of them: for which purpose he ought to be surrounded by them at a moderate distance only. The best arrangement seems to be the construction of a set of furnaces round the three sides, of a middling size, not more than 10 feet square. Or the matrasses may be heated upon furnaces, one for each, and placed close together.

Another method has been proposed to be used in this branch of manufacturing chemistry, and which is much more simple. It is no other than distilling camphire either from a retort or an alembic, keeping the upper part and neck too hot to allow of the camphire that settles there becoming solid; and to receive the liquid camphire in a tinned copper vessel, formed of two hemispheres joined together. When the camphire that has come over into the lower hemisphere is become solid, the upper hemisphere is taken off, the lower one heated a little, and the cake of camphire detached.

The camphire refined by this process is said to be equally beautiful with that refined by the old method; and there is a considerable saving in glass, as the matrasses are obliged to be broken to extract the cakes of refined camphire. *ib.*

ON BONE-BLACK.

The physical and chemical properties of animal coal have been known only for a small number of years. — Formerly ivory was exposed to fire in a close vessel merely to obtain a fine black colour for painters; but since Mr Lewitz discovered the use of charcoal for clarifying vinegar, and that the superiority of animal coal has been known from the experiments of Mr. Figuier, many manufactories of bone black have been established for supplying sugar refiners and other chemical manufacturers with this article, independent of the still greater consumption of it in making blacking for shoes.

Some manufacturers only fill earthen or iron pots with broken bones, lute on a cover with clay, pile these pots one on the other in a potter's kiln; and on the pots feeling the action of the fire, the lute cracks, and allows the volatile matter of the bones to escape, while the carbonaceous residuum is left behind; but in this manner of proceeding, the volatile matters are all lost.

In the best manufactories of bone black, it is obtained as a secondary product: the bones, previously boiled to get rid of the grease they contain, which would yield an acid that would unite with the volatile alkali, and consequently spoil the intended production of carbonate of ammonia—are distilled in large iron cylinders, and the volatile products carefully collected. These volatile products are an ammoniacal salt and liquor; an oil of a most fetid odour, which is burned in lamps for the manufacture of English lamp black; carbonized hydrogen gas, which might be used for illumination, as it gives a whiter and more lively flame than the gas of mineral coal; but the smell of the oil dissolved in it is so disagreeable that it is used only to save fuel, and contribute to the generation of itself, by being led by pipes from the receiving vessels to the fire-place, where, meeting with the air, it takes fire and burns.

This application of the gas to heat the cylinders is carried to the greatest perfection at Gros Caillou, where the cylinders are heated with other fuel, and the distillation completed by consuming the gas in the body of the furnace. The cylinders are kept always hot, the charge being put in and drawn out on an internal half cylinder of plate iron, so that the operations succeed each other constantly, without intermission.

The different kinds of bones, when distilled in close vessels, do not yield a similar kind of coal, for it varies considerably in quality. Some have supposed, that as the bones of young animals contain most gelatine, they should yield a deeper black, and more in quantity; but the large round bones, as the thigh bones of oxen, yield 40 per cent. of black, while an

equal weight from calves yields only 4 or 5 per cent. The most intense of the animal coals is true ivory black, and hence it is preferred by miniature painters.

Animal coal is a mixture of phosphate of lime, quicklime, and the carbonaceous matter, or carbone of the chemical schools. The superiority of its property of clarifying coloured liquids, depends on the mixture of these four substances. The black obtained from ivory, horns or bones that contain much gelatine, is most generally esteemed; hence some manufacturers add to the bones any soft animal matter, as blood, and the refuse of the slaughter houses, previously washed in running water, to get rid of the excrementitious matters.

The black left in the making of prussiate of potass, by the manufacturers of prussian blue, whose blood, is highly esteemed for clarifying.

Bone black that has been used for clarifying liquids, if well washed with water, and heated again, is still more efficacious than at first.

It being requisite that the bone black should be in fine powder, it is either pounded or ground in mills; some perform the grinding dry, others grind it wet, and then dry it for sale.

Mr. Guibert, a confectioner at Paris, has remarked, that wood charcoal which has been exposed to the sun, clarifies syrups much better than that which was ground dry, and used immediately. He therefore advises that the charcoal intended for clarifying liquids should be left for some time under water, then ground wet, and exposed for some time to the sun, covered an inch with water; and, when wanted, merely to drain the charcoal powder, and to use it in a moist state.

Whether this mode might be advantageously applied to bone black is not known. *ib.*

ON BISMUTH.

Bismuth, when added to a mixture of lead and tin, causes them to melt with a very low degree of heat.—

Equal quantities of these three metals may be melted in a bit of paper over a candle, without burning it: but the mixture that melts with the smallest heat is that of eight ounces of bismuth, five ounces of lead, and three ounces of tin, which melts at 202 degrees of Fahrenheit. Hence toy spoons are made of them, which being given to children to stir very hot tea, melt while they are using them. Parkes has proposed the use of these compounds of lead and tin with or without bismuth, in certain proportions, to form metallic baths, in which cutlery may be immersed for the purpose of tempering it always at the same precise temperature.

Another use of this fusible alloy, as it is called, is for making metallic pencils, to write upon paper, prepared by having burnt hartshorn well rubbed upon it. The marks are as fine as those of black lead pencil, and not so easily rubbed out. This is a very good article, and memorandum books of this kind are very convenient, being equally ready for use with black lead pencils, and yet as permanent as ink. *ib.*

ON THE STRENGTH OF FRENCH WORKING MEN.

M. Coulomb has investigated this subject in France with great care.

According to his observations, a man weighing about 70 kilogrammes, or 154lbs. avoirdupois, can ascend the stairs of a house at the rate of 48 feet in a minute, provided he did not ascend more than about 80 feet; and he is capable of continuing this action about four hours a day.

Some workmen could ascend about 492 feet by steps cut in a rock in 20 minutes; but none of them were willing to continue this for 6 hours a day, or to do it 18 times in a day.

By comparing the time taken by a man to ascend a stair, loaded with 154 lbs. avoirdupois of fire wood, he found that the quantity of action of a man, when unloaded and loaded, was nearly as two to one.

Theory shows, that when a man goes up stairs loaded, he raises his own weight, as well as the load, al-

though the load is the only useful effect that is produced: now, if the load is increased beyond about 330lbs. avoirdupois, he would scarcely be able to move it; but between these two points, of no load at all, and a load which the man can scarcely carry, there exists a point in which the exertions of the porter will be most beneficially employed, or the useful effect carried to the utmost; and this appears to be the case when the load is about three quarters the weight of the porter, or 113lbs avoirdupois.

The weight that an ordinary man can just lift or carry is about 260lbs. avoirdupois.

A man may travel unloaded, on a good level road, for several successive days, about 31 miles a day.

The weight usually carried by porters removing furniture, or the like, is about 132lbs. avoirdupois; and from theory it would appear, that 304lbs. is the greatest load which a man can carry.

By calculating from the different quantity of work which a man can perform in ascending a stair, compared with his travelling on a level road, it will follow, that it requires a man to make the same exertion to ascend the step of a stair six inches in height, as to walk eight feet and three quarters.

These results, and others obtained by M. Coulomb, may be reduced to the following uniform mode of expression, in which the force exerted is reduced to the number of pounds avoirdupois carried the space of one kilometre equal to 1093 yards .63, or 0 mile .20712.

Walking upon level ground unloaded, his daily action would be equal to carrying

5 15lbs.

Loaded with 58 kilogr. or 127lbs. avoirdupois, and returning unloaded, the useful effect is

152 .5

Walking constantly loaded, with the above weight

2012.

Carrying a load on a wheelbarrow, the useful effect is

2256.

Going up stairs unloaded

452.3

Going up stairs loaded with 53 kilogr. or 117lbs avoirdupois, the useful effect is

153.2

Drawing water from a well by two buckets, one going down empty as the other comes up full, the useful effect is

Raising a weight for driving piles, and going to another kind of work when fatigued, the useful effect is

Raising a weight for coining money, but working at it constantly

Exerting himself in turning a winch

Putting a spade about 25 centimetres, or 9 inches .83 in- to soil weighing 1898 kilogr. or 4287lbs. per cubic metre, of 39 inches .37 each side

Raising the earth and spade about four decimetres, or 15 inches .75; the earth weighing 6 kilogrammes, or 13lbs. 23

Breaking the clods, and smoothing the surface of the ground; the quantity dug in fine weather being 181 square metres in a day, and the labour estimated at one 25th of the whole work

Digging with a spade, as detailed, the whole effect is

It were to be wished that persons who employ men in laborious works would make similar observations.

ib.

MR. VAN SOEMERING'S MODE OF IMPROVING WINE.

The improvement in the mode of keeping wines, recommended by this gentleman, in the Memoires of the Academy of Sciences at Munich, is, that the wine should be kept in glass bottles, having their mouths closed with bladder instead of the usual method of corking; this being a means of mellowing and improving the wine, by giving it the advantages of age in a much less time than when kept in corked bottles.

He founded his practice on the following experiment:—On the 21st of December, 1812, four ounces of red Rhenish wine, of the growth of 1811, were put into a tumbler of common white glass, three inches and a half deep, and two inches and a quarter

wide. This was covered with a wet piece of bladder, and placed in a common sitting room, on a shelf, where it was out of the reach of the sun's rays. The glass was marked on the outside to show the space occupied by two or four ounces of wine.

Eighty-one days afterwards, it was perceived that only two ounces, or one half of the wine, remained in the tumbler; in consequence of which the glass was opened, and the wine examined.

The wine was neither mothery or mouldy, as it would have been if it had been left uncovered, or even corked for the same length of time, in the same kind of glass, and the same situation.

Dry crystalline pellicles floated on the surface, which fell to the bottom when shaken; these were found to be crystals of tartar; some of this tartar had also settled at the bottom of the tumbler.

The wine was darker coloured, but brighter and finer than the same wine bottled in the customary way; its smell and flavour was also stronger, and more agreeable than usual; although its flavour was more spiritous, still it was milder, softer, and more grateful to the palate; or, in other words, mellow.

This wine was found to contain one half more alcohol than the ordinary bottled wine of the same growth.

Experiments were then made on a larger scale, with the following results:—

It has been long known that water escaped through dried bladder; but that the bladder did not admit the passage of spirit of wine was, until this experiment unknown.

Every one knows that wine, left standing in an upright half empty bottle, either open or ever so well corked, for some weeks, will spoil and become mothery; but by closing the mouth of the bottle with bladder, wine, at least red wine, for such only has been actually tried, may be kept for a year together, not only without being spoiled, but rather improved; whence it appears that dry cork is a

158.8

165.4

38.25

255.

118.2

94 86

8.37

221.5

very inferior guard to wine than bladder.

If the mouth of the bottle is no wider than ordinary, not half an ounce of the wine will be wasted in a year's time.

The mellowness acquired by wine, when kept in the cask, and which is ascribed to age, should seem to be an effect of the same cause—the wine losing its watery particles through the wood, and depositing its saline particles in the form of a crust.

As the wine wastes by keeping in the wood, fresh wine must be added, to supply the waste, or else the whole spoils; this is not the case with bladder.

Wood lets the spirit pass as well as the water; thus, wine in wood, by losing its spirit loses its preserve; but bladder, not allowing the spirit to pass, it is retained, and keeps the wine sound, although the bottle be not half filled. Bladder also keeps out the atmospheric air, so as to prevent fermentation, and the wine turning to vinegar, which the dry staves of a half empty cask will not do; and of course vinegar is gradually formed in all casks of wine, when the filling up is omitted.

Wine, by being kept in glass, does not acquire the taint it receives from the cask, by which its colour and taste are altered.

It was judged that the mellowness acquired by wine, by keeping it twelve months in bottles, closed by bladder, was equal to that which it would acquire in twelve years' keeping in the cask.

The shallower the vessel, and the wider its mouth, the sooner is the mellowness effected. *ib.*

TO BOIL WATER IN WOODEN
VESSELS.



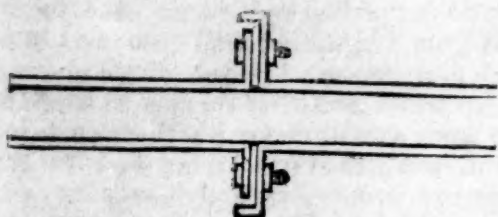
SIR,—I send you a drawing of an apparatus for boiling water in a wooden vessel, which I erected for a

gentleman in a country where fuel is scarce and dear. It answered all the purposes desired, and is attended with both economy and cleanliness. The figure represents four old musket barrels (the breech screws being out, and the touch holes plugged,) connected together by a leaden pipe, as in the dark part of the drawing.—These constitute the bottom of the fire-place, or might be converted to form the front bars of the grate, or made to serve both purposes. They are to be set in stone or brick, so as to keep the lead from the action of the fire, and at a proper height from the ground to leave space for an ash-hole. A leaden pipe is to be joined to each end, EF, and the two are to be inserted in a wooden vessel containing water, the lid of which is to be steam tight. Care must be taken that the pipes do not enter the water-vessel at equal heights; one should be near the top, and the other the bottom of the water, by which arrangement the heavier cold water enters the lower orifice, E, fills the pipes under the fire, and issues, in an attenuated boiling state, into the water-vessel through the upper orifice, F. The barrel or water vessel may be in an adjoining room, out of sight, and the water heated by the parlour fire, without any inconvenience. This mode of heating water is peculiarly adapted for families and invalids who were in the habit of using the warm bath, which is by these means always at hand, and ready, in case of emergency all hours of the day and night. It is surprising the little fuel necessary to keep the water hot after it has been heated. In the morning it was painful to the hand and kept so only by the wood embers and ashes with which the barrels were surrounded all night. The expense is trifling; for washing, the saving of fuel is considerable; and the wear and the tear is almost nothing; neither is there any danger to be apprehended from the apparatus. I strongly recommend it to private families, and will show in my next how to steam-wash clothes by means of it.

HAS. Y. SMOLET.
Lond. Mec. Mag.

Mr. Jonas Gleason of Philadelphia has for many years past been in the practice of adapting an apparatus somewhat similar to the one described in the foregoing article, to his stoves, and they are at present in pretty extensive use in that city—ED. AM. MEC. MAG.

IMPROVEMENT IN STEAM PIPE JOINTS.



SIR,—The above is what I consider an improvement in the joints of

steam pipes, which I believe to be new, never having seen it in use. It consists of having the flanch of one of the pipes made with a rim about half an inch broad and an inch thick, and the flanch of the other pipe made to fit within this rim, as in the engraving. Now, the advantages of this improvement are, that the gaskins cannot slip out of their place while the pipes are being screwed together, and that after they are screwed home, the seam round the rim can be caulked with hemp and white lead, which will render leakage impossible.

Should you think this worthy a corner in your valuable Miscellany, your insertion of it will much oblige

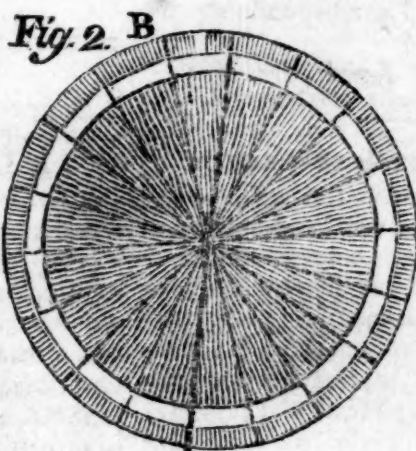
Yours truly,

R. FARLEY.

March 15th, 1825.

ib.

NEW FLY AND BAND WHEEL FOR A TURNING LATHE.



SIR,—J. Shriver, Esq. of Union Town, Penn. but at present attached to the United States' engineer service, constructed a fly and band wheel for a turning lathe a few years since, which, from the position of the woody fibres was found to answer a valuable purpose. As iron castings are expensive, and not always to be procured without trouble and inconvenience, I send you the description of Mr. Shriver's, for insertion in your useful Magazine, in hopes it may prove beneficial to some of its readers.

Description of the engraving.

Fig. 1,

Represents a cuniform piece of wood, moulded to the radii of the required circumference of the wheel, from a plank of suitable thickness. Near the wide end of this wedge a hole is perforated, as shown at A. A sufficient number of these pieces being prepared, they are to be glued together, point to point, so as to form the wheel, as shown in fig. 2, with a continuous annular perforation. When dry, a hole is to be made from the rim of the wheel, as shown at B, to this continuous perforation, into which fused lead is to be poured till the whole be filled.

The wheel is next to be placed in the lathe and turned according to the fancy of the workman, when it may be placed on its shaft, and will be found a great improvement on wooden ones of the usual construction, and I think preferable to those of iron. But of its merits I need not say any thing, for the practical mechanic will readily discover the ingenuity and usefulness of the contrivance.

Your most obedient servant;

MANIPULATOR.

Philadelphia, July, 1825.

COMPARATIVE COST OF STEAM ENGINES.

SIR,—I should be thankful to any of your correspondents who could give a table of the comparative expense of the purchase of steam engines of various construction, say of 15 horse power; and also the expense of working the same—say for one week, night and day, without intermission. In the latter of course I allude to the cost of coals, oil, or any other combustible substance or fluid that may be requisite; as also to the wear of machinery and hire of labourers.

I am, sir, an old correspondent,

Xx.

Lond. Mec. Mag.

MOTION OF THE ELECTRIC FLUID.

It has long been received as a fact, that an electrical discharge was capable of being transmitted through a very considerable distance (say two or three miles) instantaneously, and without any considerable diminution of its intensity. Mr. Barlow, however, by employing wires of various lengths, up to 340 feet, and measuring the energy of the electric action by the deflection produced in a magnetic needle, has found that the intensity diminishes very rapidly, and very nearly as the inverse square of the distance; hence the idea of constructing electrical telegraphs is quite chimerical. He found also that

the effect was greater with a wire of a certain size than with one smaller, yet that nothing was gained by increasing the diameter of the wire beyond a given limit.

March 17th, 1825.

ib.

TO MAKE CHESS-MEN.

Take fine saw dust of lime wood, put it into a clean pan; tie it close up with paper; dry it by a gentle heat; beat it in a stone mortar to a very fine powder. Take one pound of fine parchment glue, the finest gum tragacanth, and gum arabic, of each four ounces; boil the whole in clean pump water, and filter it; add as much of the wood as will make it a thick paste;—set it, in a glazed pan, in hot sand, till the moisture evaporates, and it is fit for casting. Pour or mix your colours, with the paste: scent with oil of cloves or roses, &c. The moulds should be made of pewter, and well oiled; when dry, it will be as hard as ivory; it may be turned, carved, or planed, like other wood.

I am, sir, your obedient

Humble servant,

M.

Lond. Mec. Mag.

HOW TO ADD HORSE OR OTHER POWER TO A WATER MILL.

Suppose an overshot Water Mill, the wheel of which is as large in diameter as the height will admit to receive the water, to be so situated as not to have a sufficient quantity of water to turn the wheel during some of the summer months, in consequence of which near one hundred persons are kept idle;—by what means can a small addition of force, by horses or otherwise, be employed to assist the wheel? and what will be the best method of attaching the same? *ib.*

TO GIVE SILVER PLATE A LUSTRE.

Dissolve alum in a strong ley; scum it carefully; then mix it with soap, and wash your utensils with it, using a linen rag.

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